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Editor: Ross Vani
Survey Manager: Zoltan Somogyi
Authors: Lucie Bourque and Robert Koroluk
Special thanks: Michele Lapointe and Neil Rothwell

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...	not applicable
p	preliminary
r	revised
X	suppressed to meet the confidentiality requirements of the *Statistics Act*
E	use with caution
F	too unreliable to be published

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Manure storage in Canada

This article presents various characteristics of the manure storage systems on Canadian farms, with particular attention to the dairy, beef and hog sectors. The analysis presented in this document is based on results from the 2001 Farm Environmental Management Survey (FEMS). This analysis focuses mainly on farms raising livestock, regardless of the major commodity produced on the farm.

Highlights

- The majority of all farms with livestock in Canada had solid/semi-solid manure storage systems (68.8%). A total of 14% of farms had liquid manure storage systems.
- The hog sector had the highest proportion of animals (85.7%) using liquid manure storage systems, while the beef cattle sector almost entirely used solid manure storage systems (93.9% of animals).
- More than half of the hogs (56.8%) were produced on farms that use tank manure storage systems consisting of open tank, tank below slatted floor or sealed tank. Additionally, 11.7% and 12.4% of the hogs were found on lined or unlined lagoon, respectively.
- Most farms with liquid manure storage had a storage capacity of more than 250 days. Furthermore, 9.9% of farms had liquid storage capacity with more than 400 days.
- In dairy and hog production, larger farms had a higher proportion of liquid manure storage systems than smaller farms.
- The majority of manure storage structures, both liquid and solid/semi-solid, were located more than 30 metres from the nearest water sources.
- The share of farms that have liquid or solid/semi-solid manure storage systems varies by province depending on the relative importance of livestock production, the characteristics of the production systems and the environmental conditions in which these systems have evolved.
- Quebec had the highest proportion of farms with liquid manure storage systems (36.2%) because of the importance of hog and dairy production in this province. The Atlantic provinces had the highest proportion of farms with solid/semi-solid manure storage systems (87.4%) because of the predominance of small beef cattle herds.
- Canada's principal beef producing provinces, Alberta and Saskatchewan, had the lowest proportions of liquid manure storage systems (4.5% and 2.1% respectively). On average, 40% of farms with livestock in Alberta, Saskatchewan and British Columbia had no manure storage, as open range farming is more common in these provinces, especially for cow-calf operations.

1. Introduction

This article is part of a series of studies collectively called **Farm Environmental Management in Canada.** The objective of the series is to publish the results of the *2001 Farm Environmental Management Survey (FEMS).*[1]

The series presents information about the farming practices used on Canadian farms as they relate to a number of agri-environmental topics such as manure, water, chemical inputs and sustainable land management practices.

This first article describes the characteristics of livestock manure storage systems that Canadian farmers had in place in 2001. The discussion focuses more specifically on manure storage systems for dairy, beef cattle and hogs, which together generate the largest amount of manure on farms in Canada.[2] Manure storage varies by province depending on the relative importance of livestock production, the characteristics of the production systems and the environmental conditions in which these systems have evolved. Although the focus of the analysis is mainly on the national level, some highlights about manure storage systems are also presented on a provincial basis (see also Appendix 3). In addition, provincial data are available upon request for further analysis.

The topics include some key characteristics of storage such as construction materials for storage structures, capacity, distance from a water source and adoption of Beneficial Management Practices.

Note to readers:

Readers should be aware that FEMS data alone are insufficient to assess environmental risks. The FEMS data are meant to provide an overall picture of various farming practices that have an impact on the environment. To have a full appreciation of farmers' adoption of environmental management practices and of their impact (positive or negative) on the environment, additional information and more comprehensive analysis are required. Thus, readers are invited to use caution when interpreting these data.

A previous survey, the Farm Input Management Survey 1995, (FIMS), collected similar information on manure storage systems in Canada. However, FIMS and FEMS data cannot be readily compared because of differences in survey design, sample size and questions asked.

2. Livestock manure storage and the environment

Canada is a country with vast farmlands, abundant water resources and productive agricultural areas. For these reasons, Canada has become a major producer of livestock and animal products. Based on livestock inventories on July 1, 2001[3], the cattle population in Canada was estimated at 15.4 million head, of which 1.6 million were dairy cows and heifers. There were an estimated 1.2 million head of sheep and lambs, approximately 14 million hogs[4] and 609 million broiler chickens.[5] A further 26.3 million laying hens provided the country's eggs.[6] In addition, 461,000 horses and ponies, 183,000 goats, 145,000 bison (buffalo), 128,000 elk and deer, 8.1 million turkeys, 5.3 million specialty poultry (mostly ducks and geese), 1.3 million mink, 256,000 rabbits and a wide range of other animals provided a great variety of different meat and animal products. The livestock industry is an important part of Canadian agriculture, accounting for $18.9 billion in farm cash receipts in 2001 which represented 57.9% of the total farm cash receipts (excluding program payments).

[1] FEMS was conducted in March 2002 by Statistics Canada for Agriculture and Agri-Food Canada.
FEMS provides a broad coverage of farm management practices that are related to environmental concerns in all sectors of Canadian agriculture.
Readers interested in the survey methodology for FEMS should refer to Appendix 1.

[2] This article does not examine manure storage systems for poultry and other livestock due to data limitations.

[3] Statistics Canada, *Cattle Statistics*, Vol. 2, No. 1, 2003, Catalogue no. 23-012-XIE.

[4] Statistics Canada, *Hog Statistics*, Vol. 2, No. 2, 2003, Catalogue no. 23-010-XIE.

[5] Statistics Canada, *Production of Poultry and Eggs*, 2002, Catalogue no. 23-202-XIB.

[6] Source: Statistics Canada, *2001 Census of Agriculture*.

As the livestock industry expands and becomes more intensive, health and environmental concerns over livestock manure are growing. This is particularly true when livestock are produced in large numbers under confined conditions such as beef feedlots and intensive hog and poultry barns. Livestock manure is perceived as a potential source of water and air pollution. This has led to stricter regulations on the location of livestock operations, and on the storage and handling of manure in various provinces and municipalities.

In response to growing concerns and new regulations, producers have been increasingly adopting farming practices and technologies aimed at reducing risks related to manure storage and handling, while increasing utilization of nutrients in manure.

According to Beneficial Management Practices[7] (BMPs) on livestock manure storage, an adequate system should prevent runoff, protect groundwater and surface water, minimize odour and air pollution, provide sufficient manure storage until it can be safely applied to the land, and minimize nutrient losses during storage. Each type of manure storage system - whether liquid or solid/semi-solid - has specific BMPs that attempt to reduce the risks posed to the environment. To choose the most appropriate system, farmers need to consider several factors such as costs, effectiveness, moisture content of manure, capacity of systems to meet present and future needs and location of the storage system in relation to watercourses, wells or neighbours, taking local regulations into account.

3. Types of manure storage systems

Manure storage systems have evolved over time as a result of the emergence of larger and more intensive livestock farms, technological developments, and public pressures for an environmentally responsible agricultural production.

There are a variety of options available to Canadian farmers storing livestock manure on farms, some of which reduce risks to the environment more effectively than others. This variety of options reflects the different types of animals raised and production systems used. There are two basic types of manure storage systems:

- liquid manure storage systems (such as concrete enclosures, steel tanks and tanks fabricated from other materials, either open or with covered top, tanks under or outside the barn, earthen basins, lined or unlined lagoons);

- solid storage systems (such as manure stored indoors with bedding or as a pack in the barn, manure stored outside as a pile on the ground or on a concrete pad, roofed or open, and with or without run-off containment).

The solids content of manure is generally less than 5% for liquid manure, between 5% and 20% for semi-solid manure (including slurry) and more than 20% for solid manure. The moisture content of as-excreted manure (urine and feces) ranges from 75% in poultry manure to 85% in hog manure. These ratios will change depending on the amount of water or bedding materials added to manure and depending on whether manure has been dried. Solid manure has added bedding and will not flow; therefore it can be stacked and handled as a bulk material. Liquid manure has little bedding, if any, and a moisture content over 88%. Box 1 presents a few examples of storage systems for different production and manure systems.

Liquid storage systems are used predominantly for confined animals whose manure contains a high moisture level. Thus, liquid manure storage systems are typically found in the hog industry. Solid manure storage systems are typically found in the beef cattle industry where animals spend a great portion of their time outside. Solid manure storage systems are also prevalent in the dairy industry, although liquid and semi-solid storage systems are often used in this production.

[7] Beneficial Management Practice means farm production or management practice that will contribute to reducing environmental risks or realizing environmental benefits from agriculture.

Box 1: Examples of storage systems for liquid and solid manure

Animal source of manure	Type of manure				Type of storage
	Solid manure		Liquid manure		
	Less than 50% moisture	Less than 80% moisture	88% to 92% moisture	92% or higher moisture	
Hog					
				liquid manure	Concrete or steel tank
Dairy					
				minimal bedding, high dilution[1]	Earthen storage (when adequate sealing is ensured)
			moderate bedding, medium dilution[1]		Concrete or steel tank
		high bedding, no dilution			Roofed storage
Beef					
		high bedding, no dilution			Concrete pad with separate runoff storage
Broiler Chicken					
	high bedding, no dilution				Roofed storage
	air dried manure				Contracted off-farm

[1] Dilution with milk house washwater, barn washwater, etc.
Source: Adapted from the **Ontario Ministry of Agriculture and Food**, *Livestock and Poultry Waste Management*.

4. Manure storage systems on Canadian farms

4.1 Types of systems

FEMS results show that the majority (68.8%) of farms with livestock had solid/semi-solid manure storage systems in 2001 (Table 1). A small proportion (7 %) of farms used both liquid and solid systems. Of particular note is the proportion of farms with livestock that did not have a manure storage system (24.2%). These farms either raised animals outdoors all year round or spread manure directly without storage.

In 2001, 16,885 farms with livestock (14 %) used a liquid manure storage system and 83,225 (68.8%) used a solid/semi-solid manure storage system (Table 1).

For farms that had a manure storage system, either liquid, solid or semi-solid, those that reported hogs had the highest proportion (65.7%) of liquid manure storage structures (Tables 3, 4 and 5). In comparison, farms reporting dairy cattle used 31% of these structures. Almost all farms reporting beef cattle made use of solid manure storage structures.

Table 1. Farms with livestock, by manure storage system, Canada, 2001

	Number of farms	%
Farms storing liquid manure only	8,460	7.0
Farms storing solid/semi-solid manure only	74,805	61.9
Farms storing both liquid and solid/semi-solid manure	8,425	7.0
Farms storing no manure	29,195	24.2
All farms with livestock	**120,885**	**100**
Farms storing liquid manure[1]	16,885	14.0
Farms storing solid/semi-solid manure[2]	83,225	68.8

[1] Includes farms which store both liquid and solid/semi-solid manure and farms that store liquid manure only.
[2] Includes farms which store both liquid and solid/semi-solid manure and farms that store solid/semi-solid manure only.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Use of liquid and solid/semi-solid storage systems

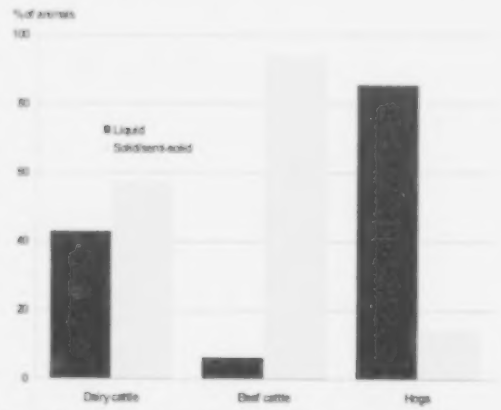
More significant than the number of farms is the share of animals produced on either system. In 2001, 42.7% of dairy cattle, 6.1% of beef cattle and 85.7% of hogs, were on a liquid manure storage system (Table 2). For beef cattle, solid storage manure was the dominant system (Figure 1). Though a significant proportion of the dairy cattle used one form or another of the liquid storage systems, solid/semi-solid manure storage systems were predominant (57.3%). For dairy and beef cattle, the single most used system remained an open pile on the ground without a roof, which was used by 20.5% of dairy cattle and 47.1% of beef cattle. For hogs, the single most used manure storage system was the open tank for liquid manure (30.4%).

Table 2. Manure storage systems,[1] by type of livestock, Canada, 2001

Manure storage systems	Dairy cattle Thousands of animals	%	Beef cattle Thousands of animals	%	Hogs Thousands of animals	%
Liquid manure storage systems						
Unlined lagoon	292	11.9	F	F	1,423	12.4
Lined lagoon	99	4.1	17 E	0.2	1,345	11.7
Open tank	421	17.2	F	F	3,491	30.4
Tank below slatted floor	105	4.3	F	F	2,433	21.2
Sealed, covered tank	65	2.7	F	F	596	5.2
Other	64	2.6	F	F	548 E	4.8
Total liquid manure storage systems	**1,046**	**42.7**	**418 E**	**6.1**	**9,837**	**85.7**
Solid or semi-solid manure storage systems						
An open pile on the ground without a roof	503	20.5	3,202	47.1	434	3.8
An open pile on the ground with a roof	37	1.5	141	2.1	F	F
Manure pack in barns, pens or corrals	215	8.8	2,090	30.7	F	F
An open pad without run-off containment	149	6.1	306	4.5	94	0.8
An open pad with containment	301	12.3	253	3.7	140	1.2
A covered storage pad	83	3.4	48 E	0.7	F	F
Other	114	4.6	345	5.1	F	F
Total solid manure storage systems	**1,403**	**57.3**	**6,386**	**93.9**	**1,643**	**14.3**
Total liquid and solid storage	**2,449**	**100**	**6,801**	**100**	**11,480**	**100**

[1] Includes only livestock on farms with manure storage systems.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey

Figure1. Liquid and solid/semi-solid manure storage, by type of livestock, Canada, 2001



Source: Statistics Canada, 2001 Farm Environmental Management Survey

Dairy cattle

In 2001, 42.7% of dairy cattle made use of liquid manure storage systems, while 57.3% made use of solid/semi-solid manure storage systems (Table 2). An open pile on the ground without a roof (20.5%) was the most commonly used solid manure system, while the second most prevalent system was an open pad with run-off containment (12.3%). The open tank (17.2%) and unlined lagoon (11.9%) were the liquid manure storage systems most commonly used for dairy cattle.

Beef cattle

Beef cattle are produced using a variety of production systems ranging from small, pasture-based cow-calf operations to large intensive feedlots. Beef producers rarely make use of liquid manure storage and handling systems because cattle manure is relatively low in moisture content. Furthermore, beef cattle are usually raised outdoors. Nationally, 93.9% of beef cattle on farms that stored manure made use of a solid manure storage system in 2001 (Table 2). The most commonly used solid manure system in beef cattle production was an uncovered open pile on the ground (47.1%) and the second most prevalent system was a manure pack (30.7%).

Hogs

Hog farms make use of liquid manure storage systems to the greatest extent. It is estimated that 85.7% of hogs used a liquid manure storage system in 2001 (Table 2). Tank-based systems predominate in hog production. More than half of the hogs were on farms that use either an open tank (30.4% of hogs), a tank below slatted floor (21.2%) or a sealed covered tank (5.2%). About one-quarter of hogs were produced on farms that use a lagoon system, either unlined (12.4%) or lined (11.7%).

Farm size

Farm size is an important variable to consider when looking at manure storage systems since larger livestock farms generally face greater social pressures and stricter regulations. In the analysis, farms with dairy, beef and hog are divided into small and large farms on the basis of herd size.

FEMS data presented in Table 3 show that farms with 47 or more dairy cows and heifers had a higher proportion (35.7%) of liquid storage systems than farms with small dairy herds (6.8%). Nevertheless, solid/semi-solid storage is the most prevalent system on all dairy farms, regardless of their size. For farms with small and large cattle herds, the single most used system is an open pile on the ground without a roof (Table 4). For hog farms, the vast majority (84.6%) of liquid storage systems were found on farms with large herds (566 pigs or more), while 56.2% of solid storage systems were located on farms with small herds (Table 5).

Table 3. Manure storage systems on dairy farms,[1] by size of herd, Canada, 2001

Manure storage system	Size of dairy herd					
	Fewer than 47 head[2]		47 or more head[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open tank	150 [4]	2.9	3,885	14.9	4,035	12.9
All other types of liquid manure storage systems	205	4.0	5,445	20.8	5,650	18.1
All types of liquid manure storage systems	**350**	**6.8**	**9,335**	**35.7**	**9,685**	**31.0**
Open pile on the ground without a roof	2,955	57.7	5,855	22.4	8,810	28.2
Open pad with containment	545	10.6	3,445	13.2	3,990	12.8
All other types of solid manure storage systems	1,380	27.0	7,495	28.7	8,875	28.4
All types of solid manure storage systems	**4,770**	**93.2**	**16,795**	**64.3**	**21,565**	**69.0**
All types of manure storage systems	**5,120**	**100**	**26,130**	**100**	**31,250**	**100**

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of dairy cows and heifers.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4. Manure storage systems on beef farms,[1] by size of herd, Canada, 2001

Manure storage system	Size of beef herd					
	Fewer than 163 head[2]		163 or more head[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	28,630	55.0	5,270	48.5	33,900	53.9
Manure pack in barns, pens or corrals	13,385	25.7	3,655	33.7	17,040	27.1
All other solid manure storage systems	10,075	19.3	1,935	17.8	12,010	19.1
All solid manure storage systems[4]	**52,090**	**100**	**10,860**	**100**	**62,950**	**100**

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5. Manure storage systems on hog farms,[1] by size of herd, Canada, 2001

Manure storage system	Size of hog herd					
	Fewer than 566 head[2]		566 or more head[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	345	6.1	685	10.4	1,030	8.4
Open tank	910	16.0	2,285	34.8	3,195	26.1
Tank below slated floor	580	10.2	1,410	21.5	1,990	16.3
Sealed, covered tank	480	8.5	F	F	F	F
All other types of liquid manure storage systems	170 [4]	3.0	F	F	F	F
All types of liquid manure storage systems	**2,485**	**43.8**	**5,555**	**84.6**	**8,040**	**65.7**
All types of solid manure storage systems	**3,190**	**56.2**	**1,015**	**15.4**	**4,205**	**34.3**
All types of manure storage systems	**5,675**	**100**	**6,570**	**100**	**12,245**	**100**

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
[4] Figures refer to number of storage structures and are not comparable to those in Table 10.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Regional differences

There are important differences in the proportion of farms using liquid or solid/semi-solid manure storage systems from one province to another, mostly due to differences in the types of animals raised, livestock production intensity and local environmental regulations. Overall, Quebec had the highest proportion of farms with liquid manure storage systems (36.2%) due to the importance of hog and dairy production. In contrast, Alberta and Saskatchewan had the lowest proportion at 4.5% and 2.1%, respectively (Table 6 and Figure 2). Meanwhile, Saskatchewan (63.1%), Alberta (55.7%), and British Columbia (51.4%) had the lowest proportions of solid/semi-solid manure storage systems, while the Atlantic provinces had the highest proportions, together representing 87.4% of farms with livestock.

The provinces with the highest share of livestock farms with no storage systems were British Columbia (43.2%), Alberta (42.6%) and Saskatchewan (35.6%). Alberta and Saskatchewan were the two provinces that also had the largest number of beef cattle farms in Canada. The lack of manure storage facilities could be explained by the fact that many of the cow-calf operations are based on pasture and rangeland, raising animals outdoors all year round. Thus, these operations would not typically have a need for manure storage systems.

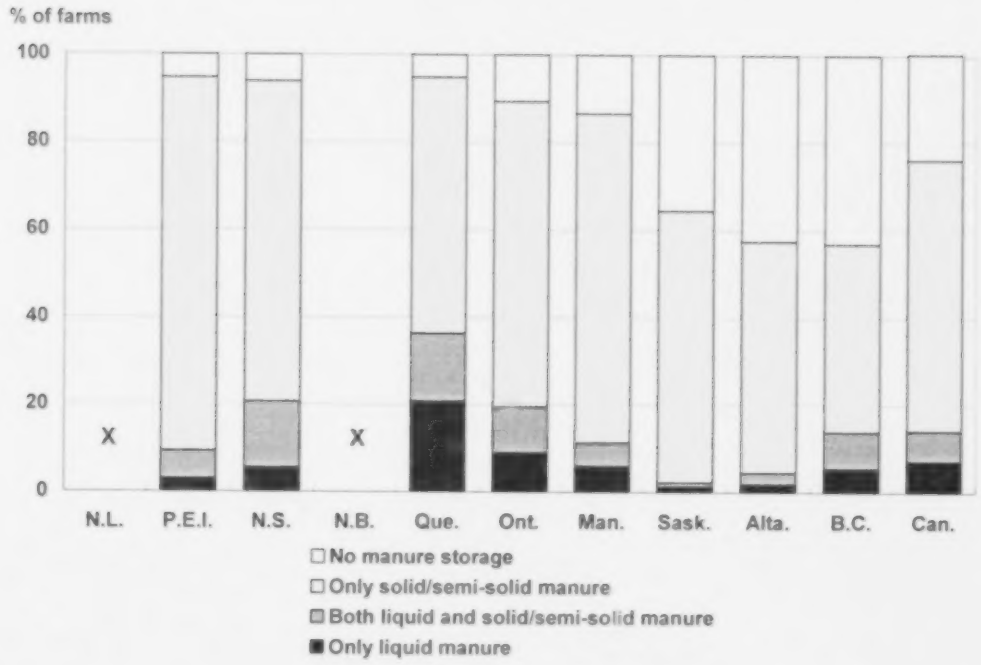
Table 6. Farms with livestock, by type of manure stored, Canada and provinces, 2001

	Farms storing liquid manure[1]		Farms storing solid/semi-solid manure[2]		Farms storing no manure		All farms with livestock[3]	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
Canada	**16,885**	**14.0**	**83,225**	**68.8**	**29,195**	**24.2**	**120,885**	**100**
Newfoundland and Labrador	35	25.0	120	85.7	X	X	X	X
Prince Edward Island	95	9.2	940	91.7	55	5.4	1,025	100
Nova Scotia	300	20.6	1,290	88.4	90	6.2	1,460	100
New Brunswick	170	13.4	1,060	83.5	X	X	X	X
Quebec	6,820	36.2	13,955	74.1	990	5.3	18,850	100
Ontario	5,495	19.4	22,740	80.3	3,015	10.7	28,295	100
Manitoba	1,225	11.2	8,820	80.7	1,470	13.4	10,940	100
Saskatchewan	470	2.1	13,780	63.1	7,780	35.6	21,830	100
Alberta	1,375	4.5	17,130	55.7	13,095	42.6	30,765	100
British Columbia	815	13.8	3,045	51.4	2,560	43.2	5,925	100

[1] Includes farms which store both liquid and solid/semi-solid manure and farms that store liquid manure only.
[2] Includes farms which store both liquid and solid/semi-solid manure and farms that store solid/semi-solid manure only.
[3] In this table, the total number of farms with livestock does not correspond to the sum of the preceding columns i.e. the sum of farms storing liquid manure, farms storing solid/semi-solid manure and farms not storing manure. The difference is due to the fact that some farms report storing both liquid and solid/semi-solid manure; these farms are taken into account under each manure storage system (liquid or solid/semi-solid). For more detailed calculations please refer to Appendix 3, Table 1.

Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

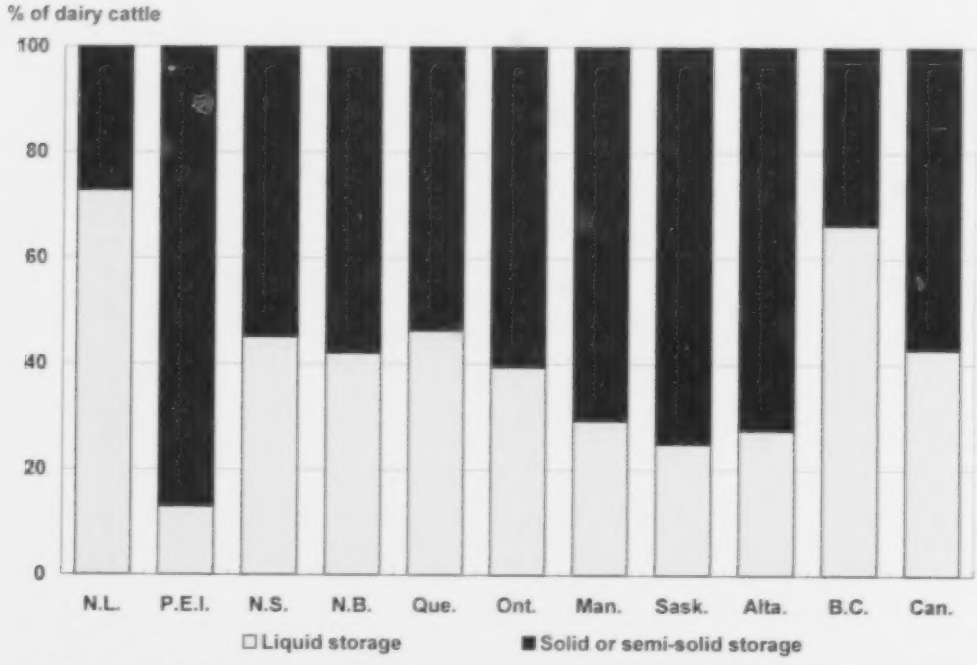
Figure 2. Manure storage systems used by farms with livestock, Canada and provinces, 2001



X suppressed to meet confidentiality requirements of the Statistics Act
Source: Statistics Canada, 2001 Farm Environmental Management Survey

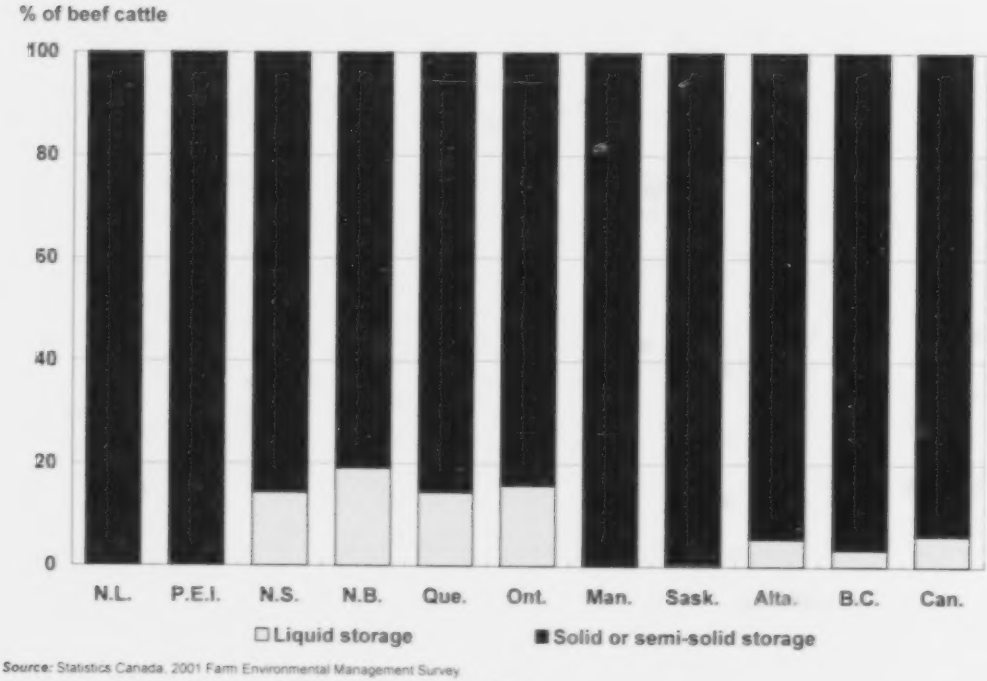
Figure 2 shows significant differences in the share of farms using liquid and solid/semi-solid storage systems across provinces. However, when comparing manure storage systems on the basis of livestock number and type, the differences between provinces are not as significant (Figures 3 to 5). For example, with the exception of British Columbia and Newfoundland and Labrador, dairy production across Canada used solid/semi-solid storage systems more frequently than liquid systems. In all provinces, beef cattle production used predominantly solid/semi-solid storage systems, while hog production used predominantly liquid storage systems.

Figure 3. Manure storage systems used for dairy cattle, Canada and provinces, 2001



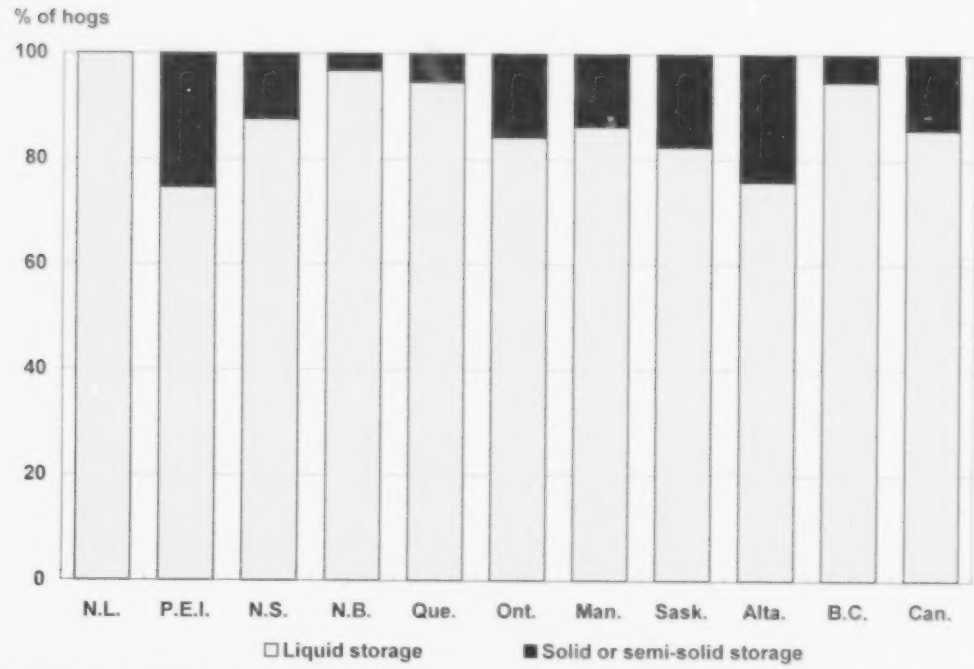
Source: Statistics Canada, 2001 Farm Environmental Management Survey

Figure 4. Manure storage systems used for beef cattle, Canada and provinces, 2001



Source: Statistics Canada, 2001 Farm Environmental Management Survey

Figure 5. Manure storage systems used for hogs, Canada and provinces, 2001



Source: Statistics Canada, 2001 Farm Environmental Management Survey

4.2 Construction materials

Several different building materials are used for the construction of liquid manure storage facilities. These construction materials are important considerations when assessing environmental risks associated with storage structures because some materials provide better manure containment than others. Manure storage systems with bottoms and sides made out of concrete were found on the majority of farms (77.2%) that store liquid manure in Canada (Table 7). Manure storage systems made out of compacted earth were found on 26.1% of farms that stored liquid manure. Steel tanks for manure storage were found on 7.6% of farms that stored liquid manure while storage systems made out of new materials, specifically geomembrane, were reported for only 0.6% of farms with liquid storage structures.

Table 7. Construction materials used for the bottom and sides of liquid manure storage structures, Canada, 2001

	Number of farms	%
Concrete	13,225	77.2
Steel	1,310	7.6
Geomembrane	105	0.6
Compacted soil	4,470	26.1
Other types of construction material	370	2.2

Note: The sum of the shares is greater than 100% as it was possible to report more than one type of material.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

With respect to covers on manure storage facilities, 75.7% of the farms with liquid manure systems did not have covers in 2001 (Table 8). A total of 28.2% of farms storing liquid manure had storage systems covered in a variety of ways, thus reducing environmental risks such as odours, greenhouse gas emissions and overflow due to heavy precipitation. Most of these farms (22.5%) had a rigid, permanent cover on their liquid manure storage structures.

Table 8. Type of roof or cover on liquid manure storage structures, Canada, 2001

	Number of farms	%
Rigid permanent	3,840	22.5
Flexible permanent	230	1.3
Temporary	275	1.6
Other types of roofs or covers	480	2.8
No cover	12,910	75.7

Note: The sum of the shares is greater than 100% as it was possible to report more than one type of material.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

4.3 Liquid storage capacity

The capacity of liquid manure storage facilities is also an important factor when assessing environmental risks. Greater storage capacity reduces the need to apply manure in unsuitable conditions, such as over the winter months, and facilitates the use of manure nutrients at a more favorable stage of crop growth.

The majority of farms with liquid manure storage had storage capacity above 250 days (Table 9). In 2001, 9,360 farms (54.9%) with liquid manure storage systems had a storage capacity of 251 days or more. Moreover, 1,690 farms (9.9%) had liquid systems with more than 400 days of storage capacity. Nevertheless, a small proportion of farms (8.2%) had a storage capacity of 100 days or less.

For hog farms in Canada, almost two-thirds (65.1 %) of the largest farms (1,595 hogs or more) had a storage capacity of more than 250 days, compared to 41.3% for farms with less than 566 hogs, as shown in Table 10.

Table 9. Liquid manure storage capacity, Canada, 2001

Number of days of manure production that can be stored	Number of farms	%
100 days or less	1,395	8.2
101 to 150 days	1,005	5.9
151 to 200 days	2,520	14.8
201 to 250 days	2,770	16.2
251 to 300 days	3,870	22.7
301 to 400 days	3,800	22.3
401 days or more	1,690	9.9
Total	**17,050**	**100**

Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 10. Liquid manure storage capacity on hog farms,[1] by size of herd, Canada, 2001

	Size of hog herd							
	Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]	
Number of days of manure production that can be stored	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
100 days or less	470	19.5	165	13.5	230	14.6	130	6.8
101 to 150 days	225	9.4	80	6.5	35	2.2	70	3.7
151 to 200 days	410	17.0	200	16.3	170	10.8	140	7.4
201 to 250 days	300	12.5	200	16.3	295	18.8	330	17.4
251 to 300 days	460	19.1	300	24.5	280	17.8	425	22.4
301 to 400 days	390	16.2	220	18.0	380	24.2	400	21.1
401 days or more	145	6.0	55	4.5	175	11.1	410	21.6
Total	**2,400**	**100**	**1,220**	**100**	**1,565**	**100**	**1,905**	**100**

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
Note: Figures refer to number of farms and are not comparable to those in Table 5. Due to rounding, figures may not add up to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

4.4 Proximity of manure storage to water sources

The proximity of manure storage facilities to a water source could be an important factor in assessing environmental risks of water contamination due to run-off and other problems related to containment. However, there are other important factors such as the age and condition of the facilities, the type and texture of the soil, the slope of the land and the presence of containment structures.

Generally, manure storage systems were well away from a water source, though liquid manure storage systems are generally a little closer. The vast majority of manure storage structures (liquid and solid/semi-solid) were located at more than 30 metres (100 feet) from a water source (Table 11).

Table 11. Proximity of liquid manure storage structures to water sources, Canada, 2001

	Water source									
	Well		Dugout or pond used for domestic water		Stream, river or lake		Wetland, marsh, pond or slough		Source for spring water or aqueduct	
Proximity to a water source	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%
Liquid manure storage structures										
30 metres (100 feet) or less	1,615	10.9	305	5.7	905	9.1	335	5.8	85	1.6
More than 30 metres (100 feet)	13,180	89.1	5,015	94.4	9,065	90.9	5,490	94.3	5,320	98.5
Solid/semi-solid manure storage structures										
30 metres (100 feet) or less	8,260	10.5	1,020	2.7	2,340	5.0	1,355	3.4	515	1.7
More than 30 metres (100 feet)	70,390	89.5	36,500	97.3	44,620	95.0	37,980	96.6	30,310	98.3

[1] Manure storage structures

Note: Due to rounding, figures may not add to totals.

Source: Statistics Canada, 2001 Farm Environmental Management Survey

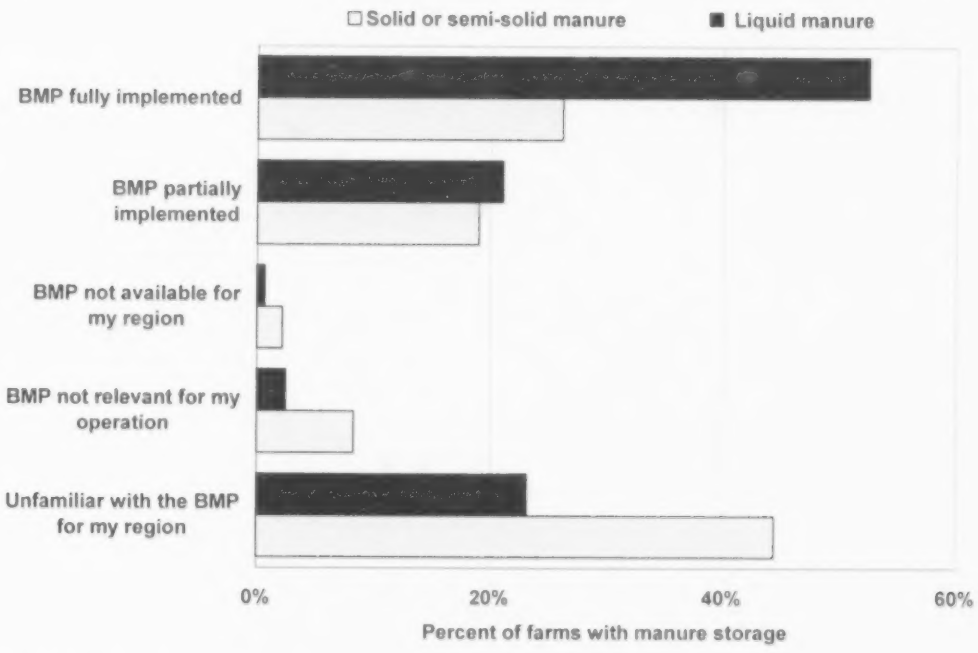
4.5 Beneficial Management Practices (BMP)

The issue of proper manure storage is closely related to the adoption of BMPs. Nationally, 52.5% of respondents with liquid manure storage systems consider that they have fully implemented the BMPs related to manure management on their farm (Figure 6). This compares to 26.2% for respondents with solid/semi-solid systems.

Conversely, respondents on 23.3% of farms with liquid manure storage systems reported that they were unfamiliar with the BMPs related to manure management in their region. For farms with solid/semi-solid storage systems, this proportion was higher (44.4%).

The results for farms with liquid systems appear to be better than the corresponding results for farms with solid/semi-solid systems. This can be expected because of the greater management and control procedures required for liquid manure storage systems.

Figure 6. Beneficial Management Practices (BMP) for manure management, Canada, 2001



Source: Statistics Canada, 2001 Farm Environmental Management Survey

5. Summary

This article provides some key insights into manure storage practices being used in 2001 on farms with livestock in Canada. A summary of the findings is presented below.

The FEMS results show that more than two-thirds (68.8%) of farms with livestock in Canada had solid/semi-solid storage systems in 2001, while 14% had liquid manure storage systems. Another 24.2% of farms with livestock did not have any type of manure storage system.

The type of storage system varies considerably by livestock type and farm size. When comparing the share of animals rather than the share of farms, liquid systems were used by 85.7% of hogs and by 42.7% of dairy cattle.

When farms producing beef have a manure storage system in place, they almost exclusively use solid manure storage systems. Nationally, 93.9% of beef cattle on these farms were raised using solid manure storage systems.

In the dairy and hog sectors, farms with large herds had a higher proportion of liquid storage systems while farms with smaller herds had a higher proportion of solid storage systems.

On a provincial basis, Quebec had the highest proportion of farms raising livestock with liquid manure storage systems (36.2%). The Atlantic provinces had the highest proportion of farms with solid/semi-solid manure storage systems (87.4%). Alberta and Saskatchewan had the lowest proportions of liquid manure storage systems (4.5% and 2.1% respectively) and also some of the lowest proportions of solid/semi-solid manure storage systems (55.7% and 63.1% respectively). The three westernmost provinces had the highest proportion of farms raising livestock with no manure storage systems.

Several characteristics of manure storage systems – e.g., construction materials, covers, proximity to a water source, storage capacity – are important factors when assessing the environmental risks associated with manure storage. The highlights of these characteristics are:

- 84.8% of farms with liquid manure storage in Canada reported concrete or steel manure storage structures. Concrete was the most common construction material used for the bottom and sides of liquid manure storage systems, it was reported on 77.2% of farms storing liquid manure.

- 75.7% of farms with liquid manure storage did not have a roof or cover on their liquid manure storage structures.

- The vast majority of manure storage structures (liquid and solid/semi-solid) were located at more than 30 metres (100 feet) from a water source.

- The majority of farms with liquid manure storage had a storage capacity of more than 250 days.

Manure storage is an important aspect of manure management. However, manure management encompasses a broad range of farming practices, depending on specific livestock production, financial capacity and agronomic conditions that vary amongst regions. Other farming practices related to manure management, including issues such as manure application and treatments will be described in the next article of *Farm Environmental Management in Canada*.

Appendix 1: Methodology for the *2001 Farm Environmental Survey*

1. Introduction

Sustainable development and environmental health are priorities of the agriculture sector. Canadian farmers are actively involved in environmental initiatives and are adopting farming practices that minimize risk to air, water and soil, while contributing to the conservation of biodiversity. The *2001 Farm Environmental Management Survey* gathered information on manure management, commercial fertilizer application, pesticide application and soil and water management practices. The survey also asked questions related to the adoption of Farm Nutrient Management Plans, Whole Farm Environmental Plans and Beneficial Management Practices.

Statistics Canada conducted the *2001 Farm Environmental Management Survey* in March 2002 on behalf of Agriculture and Agri-Food Canada. Data was collected from more than 16,000 farmers. The survey was conducted nationally covering major farm types by province and watershed.

2. Survey content

The questionnaire was designed to respond to the following issues identified in consultation with Agriculture and Agri-Food Canada.

Manure Management:

- Liquid manure storage, methods, type of construction, capacity and location, and distance from water sources
- Solid and semi-solid manure storage and methods
- Other treatments used on stored manure
- Timing and method of manure incorporation into the soil

Sustainable Grazing Systems:

- Rotational grazing practices
- Seeding practices
- Livestock access to water sources
- Feeding practices in the winter months

Crop Nutrient Management:

- Management of crop residues
- Application of chemical fertilizers by type of fertilizer (nitrogen and phosphate)
- Soil testing
- Farm nutrient management plans

Pesticide Application Practices:

- Application and timing of herbicides, insecticides and fungicides
- Application by certified persons
- Use of non-chemical methods to control weeds

Land and Water Management:

- Use of irrigation on crop land
- Source and volume of water used for irrigation
- Irrigation delivery methods
- Disposal methods for toxic waste
- Domestic water testing
- Management of land around natural sources of water
- Measures used to conserve wetland areas

Whole Farm Environmental Management:

- Development of written Whole Farm Environmental Plans
- Implementation of Beneficial Management Practices

Farm Profile Information:

- Area and type of land on the farm
- Farm type based on 51% of revenue
- Gross farm receipts

3. Data Collection

3.1 Timing and Method of Collection

The survey was conducted in March 2002. The month of March was chosen for data collection because it had the least effect on farming operations (before spring planting). The survey also tied in well with the

2001 Census of Agriculture completed in the summer of 2001. Due to time constraints, it was not possible to develop a Computer Assisted Telephone Interview (CATI) data collection technique. As a result a paper and pencil telephone interview method was used to collect the data from respondents, who had received in advance a copy of the questionnaire. Due to the farmers' heightened awareness of environmental issues, the survey was well received with an overall response rate of more than 76%.

4. Methodology

4.1 Sampling Plan

There was a requirement to report the survey results by watershed/province and farm type. The survey complexity was directly related to the complexity of the survey questions, the time it takes to collect the information and the sample size. In the case of the *2001 Farm Environmental Management Survey*, the questionnaire had 57 questions with some having a decidedly high level of complexity. In order to support the level of reporting, the sample size needed to be large as well.

4.1.1 Target Population

The target population of the *2001 Farm Environmental Management Survey* consisted of all active farms in Canada with sales greater than $10,000 excluding Yukon, Northwest Territories and Nunavut. The population was defined by the Agriculture Division's Farm Register, which was based on the *1996 Census of Agriculture*. Because of data collection constraints, farms on Indian reserves, institutional farms, community pastures, and multi-holding companies were also excluded from the survey.

4.1.2 Stratification

The first level of stratification for the farming population was by watershed. There were 48 watersheds or sub-basins with significant active farming. The watersheds were also mapped on a provincial basis. The population was further stratified on the basis of farm type. The broad farm type assigned by the *Census of Agriculture* to farms was collapsed to a maximum of six farm type groups depending on the watershed and its farming activity significance. The major farm type groups defined were: crops; dairy and hogs; livestock not including dairy and hogs; fruit; vegetables; and potatoes and other. Map 1 contains a map of Canada and the watershed (sub-basin) groups in color included in the survey. The non-color areas of the country were excluded from the survey because there was either no farming activity at all or only very marginal farming activity.

Map1. Watershed Distribution

Note: A larger colour version of this map is available from *Client Services, Agricultural Division, Statistics Canada* at 1 800 465-1991 or by e-mail at agriculture@statcan.ca
Source Environment Canada, 1977

4.1.3 Sample allocation

The total sample size was set at 22,600 farms. Allocation proportional to size was used to allocate the sample to the strata with a minimum sample size of 50 farms per stratum. The threshold for minimum sample size was designed to ensure broad representation of farms per stratum.

41.4 Sample Selection

A systematic random sample selection procedure was used to select the farms in each stratum. A further restriction was also used in the selection process to minimize overlap with three different farm-level surveys with the same collection period as the *2001 Farm Environmental Management Survey.*

4.2 Treatment of non-response

There are two types of non-response: complete non-response and partial non-response. Complete non-response applies to survey questionnaires where all questions have been left blank. In such cases, either farmers could not be contacted or they refused to take part in the survey. Complete non-response also applied when farmers answered only a few questions.

Partial non-response applies when most of the questions on the questionnaire have been answered. In these cases the respondents were unable or unwilling to answer certain questions.

4.2.1 Complete non-response

In strata where there were survey questionnaires with a status of unable to contact or refusal, the sampling weight was adjusted upward at the estimation stage to account for the loss of these units in the stratum.

4.2.2 Partial non-response

In the case of partially completed questionnaires, *2001 Census of Agriculture* data were used to complete questions related to farming activity. Questions not answered related to environmental issues were left blank and not imputed.

4.3 Estimation

After partial non-response records were imputed to the extent possible, estimates were produced both at the watershed and province levels.

4.3.1 Calculation of the Sampling Weight

The sampling weights were computed by taking the ratio of the number of farms in the population and the sample size based on the responses received in each stratum. Farms that supplied no valid data, could not be contacted or refused to participate in the survey were excluded from the response count, which resulted in an increase in the sampling weights for the included sample responses.

4.3.2 Calculation of Estimates

The ratio method was used to estimate the individual variables for the *2001 Farm Environmental Management Survey.* In each ratio, the numerator reflects the estimated population size in the domain of interest (watershed/province and farm type) and the denominator is the number of responses in the domain. The method of using estimates in the numerator as well as the denominator is known as simple expansion estimation. The estimates for the survey are based on the sampling weights described above.

4.4 Data Confidentiality

The tabulated estimates produced are subject to confidentiality restrictions prior to release. A number of checks are performed on all tabulated cells to make sure that no individual farm operation data is released. The confidentiality rules take into consideration both the number of responses in the domain and dominance of any response in the domain. If the confidentiality rules are violated in any domain then the estimates for the domain are suppressed. This allows the preservation of confidentiality without compromising the quality of the estimates.

5. Data Reliability and Limitations

The statistics contained in this publication are estimates derived from a sample survey of agricultural operations and, as such, are subject to both sampling and non-sampling errors. The quality of the estimates

is therefore dependent on the magnitude of the combined effect of these two types of errors.

6. Sampling errors

Sampling errors occur because observations are made only on a sample and not the entire population. The sampling error depends on such factors as the size of the sample, the variability of the characteristics of interest in the population, sample design and the method of estimation. For example, for a given sample size, the sampling error will depend on the stratification procedure employed, allocation of the sample, choice of sampling units and method of selection.

In sample surveys, since inference is made about the entire population covered by the survey on the basis of data obtained from only a part of the population, the results are most likely to be different than if a complete census was taken under the same general conditions. A major feature of probability sampling is that the sampling error can be measured from the sample itself.

6.1 Non-sampling errors

Non-sampling errors can occur both in cases when the estimate is based on a sample and when it is based on a complete census of the population. The errors can be introduced at different stages of the survey (such as frame definition, collection and data capture, non-response, editing, weighting, tabulations, etc.) and include the response errors introduced by the farm operators. All efforts are made to minimize the non-sampling errors through extensive edits and data analysis. However, there are some limitations to dealing with non-sampling errors. Some respondents may be reluctant to answer sensitive questions, may not understand the question correctly, and may be averse to answering questions related to the environment. All attempts are made to minimize non-sampling errors at the questionnaire design stage; however, they can never be completely eliminated.

7. Data quality

While non-sampling errors in the estimates are difficult to quantify, potential sampling errors introduced in the estimates can be estimated from the sample itself using a statistical measure called the coefficient of variation (CV). The CV, defined as the standard error divided by the survey estimate, is a measure of precision in relative terms and is expressed as a percentage. Over repeated surveys, 95 times out of a 100, the relative difference between a sample estimate and what would have been obtained from an enumeration of all farming operations with respect to the sample estimates would be less than twice the CV.

For level estimates (totals and averages), the CV is the appropriate measure of the sampling error. For proportions it is preferable to use the standard error (SE), also referred to as an absolute sampling error. In the case of the *2001 Farm Environmental Management Survey*, most of the estimates are proportions.

Example:
The proportion of all livestock farms which store liquid manure

In Canada, the estimated proportion of all livestock farms which store liquid manure is 14% with a standard error of 2.54. It can be deduced that the proportion of farms that do not store liquid manure is 86% and that the quality of the estimate is the same (i.e., the standard error is still 2.54). The standard error is an absolute error that applies to both the 14% and 86% estimates. The CV, being a relative error on the other hand, would be different for the two estimates. It can even appear good for one proportion (86%) and bad for the complementary proportion (14%) as shown below:

CV = 100 * 2.54/14 = 18
(for farms which store liquid manure)

CV = 100 * 2.54/86= 3
(for farms which do not store liquid manure)

Though the quality of the estimates is the same, the CV implies that the quality of the estimated proportion of farms which store liquid manure is much lower. In this case, as with all proportion estimates, the SE should be used.

Appendix 2: Methodology for estimating farm sizes

Every year, Statistics Canada produces estimates of the average number of livestock at July 1 and estimates of total revenues on Canadian farms by farm type and revenue class as part of its Whole Farm Data Project. For example, Canadian cattle farms earning between $50,000 and $100,000 in total revenues had an average of 146 cattle on July 1, 2000 and average 2000 revenues of $71,300. This works out to an average revenue of $488 per animal. Because of greater efficiency in production and a higher turnover of livestock inventories, larger farms would be expected to have higher average revenues per animal than smaller farms when calculated in this way.

Using this information for all revenue classes for the five-year period 1996-2000, a mathematical model that relates livestock numbers on farms to total revenues was estimated for each of the major livestock farm types. July 1 numbers can be recalculated to the January 1 reference date of the 2001 FEMS using ratios based on aggregate Statistics Canada livestock inventory data. A smooth curve, generating a mathematical equation, was obtained by plotting average revenues per animal against total revenues.

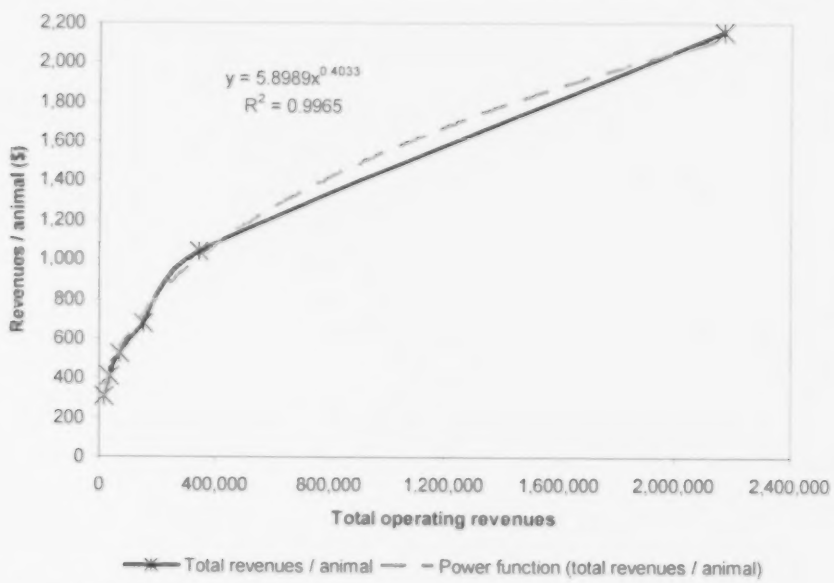
The example of beef cattle farms appears in the chart below. Estimation of the power function yields the equation:

$$\$/\text{animal} = 5.8989 * \text{total revenues}^{0.4033}$$

Thus, total revenues of $100,000 corresponds to an average of $613 per animal or 163 animals (= $100,000 / 613) on the farm at January 1.

The same methodology was used for dairy farms (based on dairy cattle and dairy heifers) and hog farms (based on total hogs). The resulting estimated equations were used to determine the number of livestock that correspond to the upper and lower bounds of the revenue ranges for each type of livestock farm. Detailed information about the estimation procedure is available upon request.

Revenues per animal for beef cattle farms, Canada, average 1996 to 2000



Source: Statistics Canada, 2002 Whole Farm Data Project

Appendix 3: Statistical Tables

Table 1A. Farms with livestock, by type of manure stored, Canada and provinces, 2001

	Farms storing liquid manure only		Farms storing solid/semi-solid manure only		Farms storing both liquid and solid/semi-solid manure		Farms storing no manure		Farms storing liquid manure[1]		Farms storing solid/semi-solid manure[2]	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
Canada	8,460	7.0	74,805	61.9	8,425	7.0	29,195	24.2	16,885	14.0	83,225	68.8
N.L.	X	X	X	X	X	X	X	X	35	25.0	120	85.7
P.E.I.	30	2.9	875	85.4	65	6.3	55	5.4	95	9.2	940	91.7
N.S.	80	5.5	1,070	73.3	220	15.1	90	6.2	300	20.6	1,290	88.4
N.B.	X	X	X	X	X	X	X	X	170	13.4	1,060	83.5
Que.	3,905	20.7	11,040	58.6	2,915	15.5	990	5.3	6,820	36.2	13,955	74.1
Ont.	2,540	9.0	19,785	69.9	2,955	10.4	3,015	10.7	5,495	19.4	22,740	80.3
Man.	650	5.9	8,245	75.4	575	5.3	1,470	13.4	1,225	11.2	8,820	80.7
Sask.	270	1.2	13,580	62.2	200	0.9	7,780	35.6	470	2.1	13,780	63.1
Alta.	540	1.8	16,295	53.0	835	2.7	13,095	42.6	1,375	4.5	17,130	55.7
B.C.	320	5.4	2,550	43.0	495	8.4	2,560	43.2	815	13.8	3,045	51.4

[1] Includes farms which store both liquid and solid/semi-solid manure and farms that store liquid manure only.
[2] Includes farms which store both liquid and solid/semi-solid manure and farms that store solid/semi-solid manure only.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 2A. Manure storage systems,[1] by type of livestock, Canada, 2001

Manure storage system	Dairy cattle		Beef cattle		Hogs	
	Thousands of animals	%	Thousands of animals	%	Thousands of animals	%
Liquid manure storage systems						
Unlined lagoon	292	11.9	F	F	1,423	12.4
Lined lagoon	99	4.1	17 [E]	0.2	1,345	11.7
Open tank	421	17.2	F	F	3,491	30.4
Tank below slatted floor	105	4.3	F	F	2,433	21.2
Sealed, covered tank	65	2.7	F	F	596	5.2
Other types of liquid manure storage systems	64	2.6	F	F	548 [E]	4.8
Total liquid manure storage systems	1,046	42.7	415 [E]	6.1	9,837	85.7
Solid or semi-solid manure storage systems						
Open pile on the ground without a roof	503	20.5	3,202	47.1	434	3.8
Open pile on the ground with a roof	37	1.5	141	2.1	F	F
Manure pack in barns, pens or corrals	215	8.8	2,090	30.7	F	F
Open pad without run-off containment	149	6.1	306	4.5	94	0.8
Open pad with containment	301	12.3	253	3.7	140	1.2
Covered storage pad	83	3.4	48 [E]	0.7	F	F
Other types of solid or semi-solid manure storage systems	114	4.6	345	5.1	F	F
Total solid manure storage systems	1,403	57.3	6,386	93.9	1,643	14.3
All types of manure storage systems	**2,449**	**100**	**6,801**	**100**	**11,480**	**100**

[1] Includes only livestock on farms with manure storage systems.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 2B. Manure storage systems,[1] by type of livestock, Quebec, 2001

Manure storage system	Dairy cattle		Beef cattle		Hogs	
	Thousands of animals	%	Thousands of animals	%	Thousands of animals	%
Liquid manure storage systems						
Unlined lagoon	76.7	8.3	F	F	F	F
Lined lagoon	X	X	X	X	X	X
Open tank	265.3	28.7	33.2	8.1	2,215.6	73.9
Tank below slatted floor	F	F	X	X	X	X
Sealed, covered tank	19.8 [E]	2.1	F	F	F	F
Other types of liquid manure storage systems	42.9 [E]	4.6	F	F	357.8 [E]	11.9
Total liquid manure storage systems	428.0	46.2	59.2	14.4	2,835.6 [E]	94.6
Solid or semi-solid manure storage systems						
Open pile on the ground without a roof	186.5	20.1	184.6	45.0	F	F
Open pile on the ground with a roof	19.2	2.1	F	F	0	0.0
Manure pack in barns, pens or corrals	13.2	1.4	49.8	12.2	F	F
Open pad without run-off containment	29.5	3.2	6.2 [E]	1.5	0	0.0
Open pad with containment	146.3	15.8	37.1 [E]	9.0	F	F
Covered storage pad	41.4	4.5	F	F	X	X
Other types of solid or semi-solid manure storage systems	61.8	6.7	F	F	F	F
Total solid manure storage systems	498.0	53.8	350.7	85.6	162.3 [E]	5.4
All types of manure storage systems	**926.0**	**100**	**409.9**	**100**	**2,997.9**	**100**

[1] Includes only livestock on farms with manure storage systems.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 2C. Manure storage systems,[1] by type of livestock, Ontario, 2001

Manure storage system	Dairy cattle		Beef cattle		Hogs	
	Thousands of animals	%	Thousands of animals	%	Thousands of animals	%
Liquid manure storage systems						
Unlined lagoon	122.6	14.0	F	F	F	F
Lined lagoon	24.9 E	2.8	F	F	F	F
Open tank	109.5	12.5	F	F	1,018.3	31.6
Tank below slatted floor	63.7	7.3	F	F	1,222.9	37.9
Sealed, covered tank	X	X	F	F	245.2	7.6
Other types of liquid manure storage systems	F	F	F	F	F	F
Total liquid manure storage systems	343.3	39.3	F	F	X	X
Solid or semi-solid manure storage systems						
Open pile on the ground without a roof	162.7	18.6	383.4	32.0	86.7 E	2.7
Open pile on the ground with a roof	F	F	30.9 E	2.6	X	X
Manure pack in barns, pens or corrals	83.6	9.6	272.5	22.7	F	F
Open pad without run-off containment	105.9	12.1	173.3	14.5	54.3	1.7
Open pad with containment	123.7	14.2	118.9	9.9	95.3 E	3.0
Covered storage pad	X	X	X	X	X	X
Other types of solid or semi-solid manure storage systems	31.6	3.6	19.9	1.7	F	F
Total solid manure storage systems	529.5	60.7	X	X	F	F
All types of manure storage systems	**872.7**	**100**	**1,199.1**	**100**	**3,225.0**	**100**

[1] Includes only livestock on farms with manure storage systems.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 2D. Manure storage systems,[1] by type of livestock, Saskatchewan, 2001

Manure storage system	Dairy cattle		Beef cattle		Hogs	
	Thousands of animals	%	Thousands of animals	%	Thousands of animals	%
Liquid manure storage systems						
Unlined lagoon	8.2 E	13.0	X	X	204.1 E	18.3
Lined lagoon	F	F	F	F	F	F
Open tank	F	F	X	X	X	X
Tank below slatted floor	X	X	0	0.0	F	F
Sealed, covered tank	F		0	0.0	F	F
Other types of liquid manure storage systems	X	X	X	X	X	X
Total liquid manure storage systems	15.6	24.9	X	X	F	F
Solid or semi-solid manure storage systems						
Open pile on the ground without a roof	24.7	39.3	721.5	49.0	45.6 E	4.1
Open pile on the ground with a roof	X	X	32.2 E	2.2	X	X
Manure pack in barns, pens or corrals	18.7	29.7	528.2	35.9	F	F
Open pad without run-off containment	X	X	30.2 E	2.0	X	X
Open pad with containment	X	X	F	F	F	F
Covered storage pad	0.0	0.0	F	F	X	X
Other types of solid or semi-solid manure storage systems	X	X	131.7	9.0	X	X
Total solid manure storage systems	47.2	75.1	X	X	X	X
All types of manure storage systems	**62.9**	**100**	**1,471.1**	**100**	**1,116.7 E**	**100**

[1] Includes only livestock on farms with manure storage systems.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 2E. Manure storage systems,[1] by type of livestock, Alberta, 2001

Manure storage system	Dairy cattle		Beef cattle		Hogs	
	Thousands of animals	%	Thousands of animals	%	Thousands of animals	%
Liquid manure storage systems						
Unlined lagoon	26.8	16.1	F	F	426.8 E	22.0
Lined lagoon	6.4 E	3.8	X	X	F	F
Open tank	X	X	X	X	F	F
Tank below slatted floor	7.6	4.6	X	X	280.0	14.4
Sealed, covered tank	X	X	0	0.0	F	F
Other types of liquid manure storage systems	X	X	X	X	X	X
Total liquid manure storage systems	45.5	27.4	X	X	1,472.4	75.8
Solid or semi-solid manure storage systems						
Open pile on the ground without a roof	50.6	30.5	1,291.3	49.5	F	F
Open pile on the ground with a roof	F	F	33.9 E	1.3	F	F
Manure pack in barns, pens or corrals	54.5 E	32.8	902.8	34.6	F	F
Open pad without run-off containment	F	F	F	F	X	X
Open pad with containment	F	F	F	F	X	X
Covered storage pad	X	X	X	X	0	0.0
Other types of solid or semi-solid manure storage systems	X	X	91.6 E	3.5	X	X
Total solid manure storage systems	120.7	72.6	X	X	470.8 E	24.2
All types of manure storage systems	**166.2**	**100**	**2,611.4**	**100**	**1,943.2**	**100**

[1] Includes only livestock on farms with manure storage systems.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 3A. Manure storage systems on dairy farms,[1] by size of herd, Canada, 2001

Manure storage system	Size of dairy herd									
	Fewer than 47 head[2]		47 to 81 head[2]		82 to 131 head[2]		132 or more head[2]		All large herds (47 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open tank	150 [E]	2.9	845	9.7	1,440	17.5	1,600	17.4	3,885	14.9	4,035	12.9
All other types of liquid manure storage systems	205	4.0	925	10.6	1,735	21.1	2,785	30.3	5,445	20.8	5,650	18.1
All types of liquid manure storage systems	**350**	**6.8**	**1,775**	**20.4**	**3,175**	**38.6**	**4,385**	**47.7**	**9,335**	**35.7**	**9,685**	**31.0**
Open pile on the ground without a roof	2,955	57.7	2,945	33.8	1,595	19.4	1,315	14.3	5,855	22.4	8,810	28.2
Open pad with containment	545	10.6	1,285	14.8	1,055	12.8	1,105	12.0	3,445	13.2	3,990	12.8
All other types of solid manure storage systems	1,380	27.0	2,705	31.1	2,395	29.1	2,395	26.0	7,495	28.7	8,875	28.4
All types of solid manure storage systems	**4,770**	**93.2**	**6,935**	**79.6**	**5,045**	**61.4**	**4,815**	**52.3**	**16,795**	**64.3**	**21,565**	**69.0**
All types of manure storage systems	**5,120**	**100**	**8,710**	**100**	**8,220**	**100**	**9,200**	**100**	**26,130**	**100**	**31,250**	**100**

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of dairy cows and heifers.
[3] Manure storage structures.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 3B. Manure storage systems on dairy farms,[1] by size of herd, Quebec, 2001

Manure storage system	Size of dairy herd									
	Fewer than 47 head[2]		47 to 81 head[2]		82 to 131 head[2]		132 or more head[2]		All large herds (47 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open tank	F	F	655	15.8	1,005	29.6	875	29.8	2,535	24.2	x	x
All other types of liquid manure storage systems	X	X	315	7.6	710	20.9	680	23.1	1,705	16.3	x	x
All types of liquid manure storage systems	**X**	**X**	**X**	**X**	**1,705**	**50.1**	**1,515**	**51.5**	**4,190**	**40.0**	**X**	**X**
Open pile on the ground without a roof	1,500	74.8	1,490	36.0	440	12.9	285	9.7	2,215	21.1	3,715	29.8
Open pad with containment	X	X	X	X	495	14.6	530	18.0	1,705	16.3	1,900	15.2
All other types of solid manure storage systems	X	X	X	X	760	22.4	610	20.7	2,365	22.6	2,675	21.4
All types of solid manure storage systems	**X**	**X**	**X**	**X**	**1,695**	**49.9**	**1,425**	**48.5**	**6,285**	**60.0**	**X**	**X**
All types of manure storage systems	**2,005**	**100**	**4,135**	**100**	**3,400**	**100**	**2,940**	**100**	**10,475**	**100**	**12,480**	**100**

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of dairy cows and heifers.
[3] Manure storage structures.
Note: Due to rounding, figures may not add to total.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 3C. Manure storage systems on dairy farms,[1] by size of herd, Ontario, 2001

Manure storage system	Size of dairy herd											
	Fewer than 47 head [2]		47 to 81 head [2]		82 to 131 head [2]		132 or more head [2]		All large herds (47 or more head) [2]		All herd sizes	
	Number of structures [3]	%	Number of structures [3]	%	Number of structures [3]	%	Number of structures [3]	%	Number of structures [3]	%	Number of structures [3]	%
Open tank	X	X	140 [r]	4.5	335	10.0	X	X	980	9.8	X	X
All other types of liquid manure storage systems	F	F	315	10.1	600	18.0	1,095	31.2	2,010	20.2	X	X
All types of liquid manure storage systems	F	F	460	14.8	935	27.7	X	X	2,985	30.0	X	X
Open pile on the ground without a roof	740	43.8	880	28.3	605	18.1	515	14.7	2,000	20.1	2,740	23.5
Open pad with containment	X	X	525	16.9	500	15.0	X	X	1,445	14.5	X	X
All other types of solid manure storage systems	X	X	1,245	40.0	1,305	39.1	970	27.7	3,520	35.4	X	X
All types of solid manure storage systems	X	X	2,650	85.2	2,410	72.3	X	X	6,965	70.0	8,565	73.6
All types of manure storage systems	1,690	100	3,110	100	3,335	100	3,505	100	9,950	100	11,640	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of dairy cows and heifers.
[3] Manure storage structures.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4A. Manure storage systems on beef farms,[1] by size of herd, Canada, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	28,630	55.0	2,810	48.7	1,385	53.2	885	45.3	185[4]	34.6	5,270	48.5	33,900	53.9
Manure pack in barns, pens or corrals	13,385	25.7	1,990	34.5	735	28.2	695	35.5	240	44.9	3,655	33.7	17,040	27.1
All other solid manure storage systems	10,075	19.3	965	16.7	485	18.6	375	19.2	110[4]	20.6	1,935	17.8	12,010	19.1
All solid manure storage systems[4]	52,090	100	5,765	100	2,605	100	1,955	100	535	100	10,860	100	62,950	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4B. Manure storage systems on beef farms,[1] by size of herd, Nova Scotia, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	380	40.6	X	X	0	0.0	X	X	0	0.0	25	41.7	405	40.7
Manure pack in barns, pens or corrals	190	20.3	X	X	0	0.0	X	X	0	0.0	35	58.3	225	22.6
All other solid manure storage systems	365	39.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	365	36.7
All solid manure storage systems[4]	935	100	X	X	0	0.0	X	X	0	0.0	60	100	995	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4C. Manure storage systems on beef farms,[1] by size of herd, Quebec, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	3,025	60.6	F	F	F	F	F	F	X	X	220	45.4	3,245	59.2
Manure pack in barns, pens or corrals	740	14.8	X	X	F	F	F	F	X	X	80	16.5	820	15.0
All other solid manure storage systems	1,230	24.6	X	X	85[4]	63.0	F	F	X	X	185	38.1	1,415	25.8
All solid manure storage systems[4]	4,995	100	X	X	135	100	155	100	X	X	485	100	5,480	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4D. Manure storage systems on beef farms,[1] by size of herd, Ontario, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	5,825	42.7	405	29.3	F	F	F	F	F	F	605	28.1	6,430	40.9
Manure pack in barns, pens or corrals	3,230	23.7	415	30.0	F	F	X	X	X	X	660	30.7	3,890	24.8
All other solid manure storage systems	4,590	33.7	565	40.7	X	X	115[4]	34.4	X	X	885	41.1	5,400	34.4
All solid manure storage systems[4]	13,640	100	1,385	100	305	100	365	100	95	100	2,155	100	15,725	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4E. Manure storage systems on beef farms,[1] by size of herd, Manitoba, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	3,750	57.8	545	58.4	F	F	F	F	X	X	880	60.9	4,630	58.4
Manure pack in barns, pens or corrals	1,905	29.4	X	X	X	X	F	F	X	X	420	29.1	2,325	29.3
All other solid manure storage systems	835	12.9	F	F	X	X	F	F	0	0.0	145	10.0	980	12.3
All solid manure storage systems[4]	6,490	100	935	100	270	100	210	100	30	100	1,445	100	7,930	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4F. Manure storage systems on beef farms,[1] by size of herd, Saskatchewan, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	5,400	48.0	850	49.3	330	43.7	X	X	X	X	1,400	47.9	6,800	48.0
Manure pack in barns, pens or corrals	3,755	33.4	670	38.8	240	31.8	X	X	F	F	1,095	37.5	4,850	34.2
All other solid manure storage systems	2,095	18.5	180 E	11.9	200 E	24.5	X	X	X	X	425	14.6	2,520	17.8
All solid manure storage systems[4]	11,250	100	1,700	100	770	100	375	100	75	100	2,920	100	14,170	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 4G. Manure storage systems on beef farms,[1] by size of herd, Alberta, 2001

Manure storage system	Size of beef herd: Fewer than 163 head[2]		163 to 281 head[2]		282 to 425 head[2]		426 to 1,241 head[2]		1,242 or more head[2]		All large herds (163 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Open pile on the ground without a roof	8,515	68.6	805	55.1	615	58.2	x	x	F	F	1,950	53.9	10,465	65.3
Manure pack in barns, pens or corrals	3,080	24.8	500	34.2	355	33.6	230	30.9	170[4]	47.6	1,255	34.7	4,335	27.0
All other solid manure storage systems	815	6.6	155[4]	10.7	85[4]	8.1	x	x	x	x	415	11.4	1,225	7.7
All solid manure storage systems	12,410	100	1,460	100	1,055	100	745	100	355	100	3,620	100	16,030	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Head of beef cattle.
[3] Manure storage structures.
[4] Does not include liquid manure storage structures due to confidentiality requirements of the Statistics Act.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5A. Manure storage systems on hog farms,[1] by size of herd, Canada, 2001

Manure storage system	Size of hog herd: Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	345	6.1	F	F	X	X	515	11.1	680	10.4	1,030	8.4
Open tank	910	16.0	850	39.8	800	38.1	830	29.5	2,280	34.9	3,190	26.1
Tank below slatted floor	580	10.2	475	22.9	410	19.5	625	22.1	1,410	21.5	1,990	16.3
Sealed, covered tank	480	8.5	F	F	F	F	170[4]	6.0	F	F	F	F
All other types of liquid manure storage systems	170[4]	3.0	F	F	F	F	440	10.5	F	F	F	F
All types of liquid manure storage systems	2,485	43.8	1,360	62.9	1,810	86.2	2,365	84.3	5,555	84.8	8,040	65.7
All types of solid manure storage systems	3,190	56.2	250	17.1	290	13.8	445	15.7	1,015	15.4	4,205	34.3
All types of manure storage systems	5,675	100	1,640	100	2,100	100	2,830	100	6,570	100	12,245	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
Note: Figures refer to number of storage structures and are not comparable to those in Table5A.
Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5B. Manure storage systems on hog farms,[1] by size of herd, Quebec, 2001

Manure storage system	Size of hog herd: Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	X	X	0	0.0	F	F	X	X	85	4.7	140	5.1
Open tank	620	66.0	305	84.7	515	76.9	465	64.7	1,305	73.3	1,925	70.8
Tank below slatted floor	X	X	0	0.0	0	0.0	X	X	X	X	30	1.1
Sealed, covered tank	F	F	0	0.0	X	X	F	F	X	X	125	4.7
All other types of liquid manure storage systems	F	F	X	X	X	X	F	F	105	11.1	240	8.8
All types of liquid manure storage systems	780	83.0	X	X	X	X	X	X	1,655	93.0	2,435	89.5
All types of solid manure storage systems	160[4]	17.0	X	X	X	X	X	X	125	7.0	285	10.5
All types of manure storage systems	940	100	360	100	670	100	730	100	1,780	100	2,720	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
Note: Figures refer to number of storage structures and are not comparable to those in Table 9B.
Due to rounding figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5C. Manure storage systems on hog farms,[1] by size of herd, Ontario, 2001

Manure storage system	Size of hog herd: Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	F	F	X	X	X	X	F	F	100	4.6	160	3.4
Open tank	255	11.6	340	44.4	245	33.3	265	26.2	870	34.7	1,125	23.9
Tank below slatted floor	220	10.0	230	30.1	225	30.6	420	41.6	875	34.9	1,095	23.3
Sealed, covered tank	225	10.3	X	X	X	X	F	F	215	8.5	440	9.3
All other types of liquid manure storage systems	X	3	X	X	X	X	F	F	85	3.4	115	2.4
All types of liquid manure storage systems	790	36.0	X	X	X	X	870	86.1	2,140	85.3	2,930	62.3
All types of solid manure storage systems	1,405	64.0	X	X	X	X	140[4]	13.9	370	14.7	1,775	37.7
All types of manure storage systems	2,195	100	765	100	735	100	1,010	100	2,510	100	4,705	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
Note: Figures refer to number of storage structures and are not comparable to those in Table 9C. Due to rounding figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5D. Manure storage systems on hog farms,[1] by size of herd, Manitoba, 2001

Manure storage system	Size of hog herd: Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	F	F	X	X	F	F	115[4]	27.1	170	19.4	245	16.8
Open tank	0	0.0	0	0.0	0	0.0	X	X	X	X	X	X
Tank below slatted floor	150[4]	25.4	F	F	95[4]	38.0	F	F	240	27.8	390	26.8
Sealed, covered tank	F	F	X	X	F	F	X	X	X	X	X	X
All other types of liquid manure storage systems	X	X	X	X	X	X	125[4]	29.4	170	19.7	175	12.1
All types of liquid manure storage systems	325	55.1	X	X	X	X	X	X	665	76.7	990	67.9
All types of solid manure storage systems	265	44.9	X	X	X	X	F	F	205	23.4	470	32.1
All types of manure storage systems	590	100	195	100	250	100	425	100	870	100	1,460	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
Note: Figures refer to number of storage structures and are not comparable to those in Table 9D. Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5E. Manure storage systems on hog farms,[1] by size of herd, Saskatchewan, 2001

Manure storage system	Size of hog herd: Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	x	x	F	F	x	x	F	F	85	27.5	95	11.3
Open tank	0	0.0	0	0.0	x	x	0	0.0	x	x	x	x
Tank below slatted floor	F	F	0	0.0	x	x	x	x	30	10.5	85	9.7
Sealed, covered tank	F	F	x	x	x	x	0	0.0	x	x	x	x
All other types of liquid manure storage systems	F	F	0	0.0	x	x	x	F	45	14.8	105	12.4
All types of liquid manure storage systems	185	33.3	F	F	X	X	X	X	160	58.7	365	42.3
All types of solid manure storage systems	370	66.7	X	X	X	X	F	F	130	42.3	500	58.0
All types of manure storage systems	555	100	40	100	130	100	135	100	305	100	860	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 5F. Manure storage systems on hog farms,[1] by size of herd, Alberta, 2001

Manure storage system	Size of hog herd: Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%	Number of structures[3]	%
Unlined lagoon	180[4]	11.9	F	F	100[4]	34.5	F	F	220	24.8	350	17.7
Open tank	0	X	0	0.0	X	X	X	X	X	X	40	2.1
Tank below slatted floor	190[4]	12.6	F	F	F	F	F	F	210	23.5	360	18.1
Sealed, covered tank	X	X	F	F	X	X	X	X	X	X	105	5.2
All other types of liquid manure storage systems	0	F	X	X	F	F	125[4]	32.9	180	20.1	205	10.5
All types of liquid manure storage systems	360	33.0	X	X	X	X	260	73.7	695	78.1	1,055	53.3
All types of solid manure storage systems	730	67.0	X	X	F	F	100[4]	26.3	195	22.0	925	46.8
All types of manure storage systems	1,090	100	220	100	290	100	380	100	890	100	1,980	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
[3] Manure storage structures.
Note: Figures refer to number of storage structures and are not comparable to those in Table 9E. Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 6A. Construction material used for the bottom and sides of liquid manure storage structures, Canada and provinces, 2001

	Concrete		Steel		Geomembrane		Compacted soil		Other types of construction material	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
Canada	13,225	77.2	1,310	7.6	105	0.6	4,470	26.1	370	2.2
N.L.	F	F	X	X	0	0.0	X	X	0	0.0
P.E.I.	95 [E]	95.0	X	X	X	X	X	X	X	X
N.S.	240	80.0	30	10.0	0	0.0	90	30.0	30	10.0
N.B.	X	X	X	X	0	0.0	85 [E]	50.0	X	X
Que.	6,065	88.4	585	8.5	X	X	865	12.6	X	X
Ont.	4,430	78.4	460	8.1	0	0.0	1,565	27.7	85	1.5
Man.	745	56.9	X	X	X	X	540	41.2	95	7.3
Sask.	235	56.6	30	7.2	X	X	195	47.0	X	X
Alta.	645	44.0	40	2.7	35	2.4	825	56.3	50	3.4
B.C.	635	77.4	85	10.4	0	0.0	275	33.5	55	6.7

Note: The sum of the shares is greater than 100% as it was possible to report more than one type of material.

Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 7A. Type of roof or cover on liquid manure storage structures, Canada and provinces, 2001

	Rigid permanent		Flexible permanent		Temporary		Other types of roofs or covers		No cover	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
Canada	3,840	22.5	230	1.3	275	1.6	480	2.8	12,910	75.7
N.L.	X	X	X	X	0	0.0	0	0.0	F	F
P.E.I.	30	30.0	X	X	X	X	0	0.0	65 [1]	65.0
N.S.	100	33.3	X	X	X	X	0	0.0	205	68.3
N.B.	X	X	X	X	0	0.0	X	X	X	X
Que.	600	8.8	85	1.2	X	X	X	X	6,185	90.4
Ont.	1,720	30.7	70	1.2	60	1.1	220	3.9	3,970	70.8
Man.	640	49.6	X	X	120	9.3	X	X	520	40.3
Sask.	180	41.4	X	X	X	X	45	10.3	215	49.4
Alta.	355	24.5	X	X	X	X	150	10.3	935	64.5
B.C.	175	21.3	X	X	X	X	X	X	655	79.9

Note: The sum of the shares is greater than 100% as it was possible to report more than one type of roof or cover.

Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 8A. Liquid manure storage capacity, Canada and provinces, 2001

	Number of days of manure production that can be stored													
	100 days or less		101 to 150 days		151 to 200 days		201 to 250 days		251 to 300 days		301 to 400 days		401 days and more	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
Canada	1,395	8.2	1,005	5.9	2,520	14.8	2,770	16.2	3,870	22.7	3,800	22.3	1,690	9.9
N.L.	0	0.0	X	X	F	F	X	X	X	X	0	0.0	0	0.0
P.E.I.	X	X	X	X	30	30.0	25	25.0	X	X	X	X	X	X
N.S.	0	0.0	50	16.7	85	28.3	90	30.0	50	16.7	X	X	X	X
N.B.	X	X	X	X	35	20.6	35	20.6	X	X	50	29.4	0	0.0
Que.	X	X	X	X	485	7.1	1,385	20.2	2,535	37.0	1,815	26.5	540	7.9
Ont.	265	4.7	275	4.9	1,275	22.7	990	17.6	995	17.7	1,250	22.3	550	9.8
Man.	440	34.1	180	14.0	X	X	X	X	X	X	X	X	275	21.3
Sask.	175	40.2	X	X	45	10.3	X	X	40	9.2	45	10.3	85	19.5
Alta.	380	26.0	130	8.9	135	9.2	135	9.2	115	7.9	350	24.0	215	14.7
B.C.	65	8.0	310	38.3	300	37.0	50	6.2	35	4.3	35	4.3	X	X

Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey

Table 9A. Liquid manure storage capacity on hog farms,[1] by size of herd, Canada, 2001

Number of days of manure production that can be stored	Number of hogs									
	Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
100 days or less	470	19.5	165	13.5	230	14.6	130	6.8	525	11.2	995	14.0
101 to 150 days	225	9.4	80	6.5	35	2.2	70	3.7	185	3.9	410	5.8
151 to 200 days	410	17.0	200	16.3	170	10.8	140	7.4	510	10.9	920	13.0
201 to 250 days	300	12.5	200	16.3	295	18.8	330	17.4	825	17.6	1,125	15.9
251 to 300 days	460	19.1	300	24.5	280	17.8	425	22.4	1,005	21.4	1,465	20.7
301 to 400 days	390	16.2	220	18.0	380	24.2	400	21.1	1,000	21.3	1,390	19.6
401 days or more	145	6.0	55	4.5	175	11.1	410	21.6	640	13.6	785	11.1
All hog farms storing liquid manure	2,400	100	1,220	100	1,565	100	1,905	100	4,690	100	7,090	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
Note: Figures refer to number of farms and are not comparable to those in Table 5A. Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 9B. Liquid manure storage capacity on hog farms,[1] by size of herd, Quebec, 2001

Number of days of manure production that can be stored	Number of hogs									
	Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
100 days or less	x	x	0	0.0	0	0.0	0	0.0	0	0.0	x	x
101 to 150 days	0	0.0	x	x	x	x	x	x	x	x	x	x
151 to 200 days	x	x	40	12.5	x	x	x	x	x	x	205	8.5
201 to 250 days	95	12.4	55	17.2	180	27.5	110	16.7	345	21.2	440	18.4
251 to 300 days	320	41.8	110	34.4	240	36.6	275	41.7	625	38.5	945	39.6
301 to 400 days	185	24.2	85	26.6	180	27.5	140	21.2	405	24.9	590	24.7
401 days or more	x	x	x	x	40	6.1	100	15.2	x	x	180	7.6
All hog farms storing liquid manure	765	100	320	100	655	100	655	100	1,625	100	2,390	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
Note: Figures refer to number of farms and are not comparable to those in Table 5B. Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 9C. Liquid manure storage capacity on hog farms,[1] by size of herd, Ontario, 2001

Number of days of manure production that can be stored	Number of hogs											
	Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
100 days or less	115	14.6	X	X	45	10.6	X	X	90	5.9	205	8.9
101 to 150 days	45	5.7	X	X	X	X	X	X	85	5.8	130	5.8
151 to 200 days	225	28.5	125	23.6	85	20.0	70	13.3	280	18.8	505	22.2
201 to 250 days	185	23.4	85	16.2	85	20.0	160	30.5	330	22.1	515	22.7
251 to 300 days	70	8.9	170	32.4	X	X	X	X	255	17.0	325	14.3
301 to 400 days	85	10.8	90	17.1	120	28.2	120	22.9	330	22.1	415	18.3
401 days or more	55	7.0	0	0.0	55	12.9	70	13.3	125	8.4	180	7.9
All hog farms storing liquid manure	780	100	530	100	435	100	530	100	1,495	100	2,275	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
Note: Figures refer to number of farms and are not comparable to those in Table 5C. Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 9D. Liquid manure storage capacity on hog farms,[1] by size of herd, Manitoba, 2001

Number of days of manure production that can be stored	Number of hogs											
	Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
100 days or less	125[E]	39.1	F	F	80[E]	45.7	X	X	165	28.5	290	32.0
101 to 150 days	110	34.4	35[E]	29.2	X	X	X	X	45	7.6	155	17.0
151 to 200 days	X	X	0	0.0	X	X	X	X	X	X	X	X
201 to 250 days	0	0.0	0	0.0	X	X	0	0.0	X	X	X	X
251 to 300 days	X	X	0	0.0	0	0.0	35	11.9	35	6.0	X	X
301 to 400 days	40	12.5	X	X	X	X	65	22.0	100	17.1	140	15.3
401 days or more	40	12.5	25	20.8	35	20.0	125[E]	42.4	185	32.0	225	24.8
All hog farms storing liquid manure	325	100	115	100	175	100	290	100	580	100	905	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs.
Note: Figures refer to number of farms and are not comparable to those in Table 5.D. Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.

Table 9E. Liquid manure storage capacity on hog farms,[1] by size of herd, Alberta, 2001

Number of days of manure production that can be stored	Number of hogs											
	Fewer than 566 head[2]		566 to 981 head[2]		982 to 1,594 head[2]		1,595 or more head[2]		All large herds (566 or more head)[2]		All herd sizes	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
100 days or less	110	33.8	90[E]	44.7	75[E]	39.0	40	16.3	205	31.9	315	32.4
101 to 150 days	75	23.1	X	X	X	X	X	X	30	4.8	105	10.9
151 to 200 days	X	X	0	0.0	25	12.2	X	X	X	X	60	6.3
201 to 250 days	X	X	50	26.3	0	0.0	30	12.2	X	X	X	X
251 to 300 days	35	10.8	X	X	X	X	30	12.2	40	6.4	75	7.8
301 to 400 days	65	20.0	30	15.8	45	22.0	60	24.5	135	21.0	200	20.6
401 days or more	X	X	X	X	X	X	75	30.6	110	17.1	X	X
All hog farms storing liquid manure	330	100	185	100	205	100	250	100	640	100	975	100

[1] Includes only farms with manure storage systems. For details of the methodology used for the size breakdown, see Appendix 2.
[2] Number of hogs

Note: Figures refer to number of farms and are not comparable to those in Table 5F. Due to rounding, figures may nadd to totals.

Source: Statistics Canada, 2001 Farm Environmental Management Survey

Table 10A. Proximity of liquid manure storage structures to water sources, Canada and provinces, 2001

	Water source									
	Well		Dugout or pond used for domestic water		Stream, river or lake		Wetland, marsh, pond or slough		Source for spring water or aqueduct	
	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%
Canada										
30 metres (100 feet) or less	1,615	10.9	305	5.7	905	9.1	335	5.8	85	1.6
More than 30 metres (100 feet)	13,180	89.1	5,015	94.4	9,065	90.9	5,490	94.3	5,320	98.5
Newfoundland and Labrador										
30 metres (100 feet) or less	X	X	X	X	X	X	0	0.0	0	0.0
More than 30 metres (100 feet)	F	F	X	X	F	F	F	F	X	X
Prince Edward Island										
30 metres (100 feet) or less	X	X	0	0.0	X	X	X	X	X	X
More than 30 metres (100 feet)	X	X	F	F	F	F	F	F	F	F
Nova Scotia										
30 metres (100 feet) or less	40	13.3	X	X	X	X	X	X	0	
More than 30 metres (100 feet)	255[1]	85.0	F	F	X	X	X	X	F	F
New Brunswick										
30 metres (100 feet) or less	X	X	0	0.0	0	0.0	0	0.0	0	0.0
More than 30 metres (100 feet)	F	F	F	F	F	F	F	F	F	F
Quebec										
30 metres (100 feet) or less	455	7.9	50	2.3	510	10.9	60	2.8	25	0.9
More than 30 metres (100 feet)	5,275	92.0	2,155	98.0	4,190	89.2	2,075	97.0	2,745	98.7
Ontario										
30 metres (100 feet) or less	745	13.8	85	6.3	310	9.7	X	X	X	X
More than 30 metres (100 feet)	4,655	86.1	1,270	94.1	2,890	90.5	X	X	X	X
Manitoba										
30 metres (100 feet) or less	115	12.2	85	16.5	X	X	45	8.3	X	X
More than 30 metres (100 feet)	830	88.3	435[1]	84.5	X	X	505[1]	92.7	X	X
Saskatchewan										
30 metres (100 feet) or less	X	X	45	12.9	50	16.9	100	28.6	X	X
More than 30 metres (100 feet)	X	X	310[1]	88.6	245[1]	83.1	255[1]	72.9	X	X
Alberta										
30 metres (100 feet) or less	120	10.9	30	4.9	X	X	40	7.8	X	X
More than 30 metres (100 feet)	985	89.1	590	95.9	X	X	490[1]	95.1	X	X
British Columbia										
30 metres (100 feet) or less	40	7.9	0	0.0	15	4.1	30	13.3	0	0.0
More than 30 metres (100 feet)	460	91.1	F	F	350	94.6	195[1]	86.7	F	F

[1] Manure storage structures

Note: Due to rounding, figures may not add to totals.

Source: Statistics Canada, 2001 Farm Environmental Management Survey

Table 10B. Proximity of solid/semi-solid manure storage structures to water sources, Canada and provinces, 2001

	Water source									
	Well		Dugout or pond used for domestic water		Stream, river or lake		Wetland, marsh, pond or slough		Source for spring water or aqueduct	
	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%	Number of structures[1]	%
Canada										
30 metres (100 feet) or less	8,260	10.5	1,020	2.7	2,340	5.0	1,355	3.4	515	1.7
More than 30 metres (100 feet)	70,390	89.5	36,500	97.3	44,620	95.0	37,980	96.6	30,310	98.3
Newfoundland and Labrador										
30 metres (100 feet) or less	X	X	0	0.0	X	X	X	X	0	0.0
More than 30 metres (100 feet)	X	X	F	F	F	F	F	F	F	F
Prince Edward Island										
30 metres (100 feet) or less	105	10.8	X	X	X	X	X	X	0	0.0
More than 30 metres (100 feet)	865	89.2	X	X	X	X	X	X	445	100
Nova Scotia										
30 metres (100 feet) or less	190	15.8	X	X	60	6.7	50	7.8	X	X
More than 30 metres (100 feet)	1,030	85.5	X	X	835	93.8	600	93.0	X	X
New Brunswick										
30 metres (100 feet) or less	X	X	X	X	35	3.8	25	3.6	X	X
More than 30 metres (100 feet)	X	X	X	X	880	95.7	660	95.7	X	X
Quebec										
30 metres (100 feet) or less	1,335	11.4	115	2.5	950	9.7	100	2.2	130	2.1
More than 30 metres (100 feet)	10,420	88.6	4,565	97.5	8,875	90.3	4,480	97.9	5,965	97.9
Ontario										
30 metres (100 feet) or less	3,010	13.1	190	2.8	730	6.2	450	4.7	160	2.5
More than 30 metres (100 feet)	19,935	86.9	6,505	97.2	11,085	93.9	9,140	95.4	6,355	97.5
Manitoba										
30 metres (100 feet) or less	615	8.1	170	3.7	160	3.5	160	3.4	60	1.7
More than 30 metres (100 feet)	6,960	91.8	4,375	96.3	4,365	96.5	4,540	96.7	3,370	98.1
Saskatchewan										
30 metres (100 feet) or less	1,420	10.2	160	1.7	185	2.3	340	4.0	55	0.8
More than 30 metres (100 feet)	12,455	89.7	9,215	98.3	8,000	97.7	8,245	96.1	6,800	99.1
Alberta										
30 metres (100 feet) or less	1,370	8.1	305	3.1	160	1.9	180	2.0	65	1.2
More than 30 metres (100 feet)	15,570	91.9	9,655	96.9	8,285	98.2	8,795	98.0	5,525	98.7
British Columbia										
30 metres (100 feet) or less	105	4.8	60	7.6	45	2.7	40	4.0	0	0.0
More than 30 metres (100 feet)	2,070	95.4	730	93.0	1,625	97.6	970	96.0	675	100

[1] Manure storage structures

Note: Due to rounding, figures may not add to totals.

Source: Statistics Canada, 2001 Farm Environmental Management Survey

Table 11A. Beneficial Management Practices (BMP) for manure management on farms with manure storage, Canada and provinces, 2001

	Extent of BMP implementation									
	BMP fully implemented		BMP partially implemented		BMP not available for my region		BMP not relevant for my operation		Unfamiliar with the BMI for my region	
	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%	Number of farms	%
Canada										
Liquid manure storage	8,645	52.5	3,470	21.1	120	0.7	410	2.5	3,830	23.3
Solid or semi-solid manure storage	21,170	26.2	15,385	19.0	1,760	2.2	6,705	8.3	35,920	44.4
Newfoundland and Labrador										
Liquid manure storage	F	F	x	x	0	0.0	0	0.0	x	x
Solid or semi-solid manure storage	65	54.2	x	x	x	x	0	0.0	45	37.5
Prince Edward Island										
Liquid manure storage	40	44.4	30	33.3	x	x	x	x	x	x
Solid or semi-solid manure storage	300	33.7	240	27.0	x	x	x	x	315	35.4
Nova Scotia										
Liquid manure storage	40	13.3	30	10.0	25	8.3	0	0.0	215 E	71.7
Solid or semi-solid manure storage	180	14.2	215	16.9	x	x	x	x	800	63.0
New Brunswick										
Liquid manure storage	x	x	x	x	x	x	x	x	35	21.9
Solid or semi-solid manure storage	170	16.9	x	x	x	x	95	9.5	550	54.7
Quebec										
Liquid manure storage	5,160	76.8	1,220	18.2	x	x	x		155	2.3
Solid or semi-solid manure storage	8,015	58.4	3,715	27.1	130	0.9	935		925	6.7
Ontario										
Liquid manure storage	1,885	35.2	1,610	30.0	x	x	x	x	1,710	31.9
Solid or semi-solid manure storage	3,945	17.8	5,440	24.5	470	2.1	1,900	8.6	10,470	47.1
Manitoba										
Liquid manure storage	470	39.7	185	15.6	x	x	x	x	520	43.9
Solid or semi-solid manure storage	2,600	30.8	1,360	16.1	210	2.5	560	6.6	3,730	44.1
Saskatchewan										
Liquid manure storage	80	16.8	x	x	x	x	x	x	345	72.6
Solid or semi-solid manure storage	1,850	13.8	1,215	9.1	660	4.9	1,180	8.8	8,505	63.5
Alberta										
Liquid manure storage	430	31.9	195	14.4	x	x	x	x	675	50.0
Solid or semi-solid manure storage	2,845	16.8	2,490	14.7	125	0.7	1,555	9.2	9,890	58.5
British Columbia										
Liquid manure storage	465	58.9	145	18.4	x	x	x	x	145	18.4
Solid or semi-solid manure storage	1,210	40.7	540	18.2	110	3.7	425	14.3	690	23.2

Note: Due to rounding, figures may not add to totals.
Source: Statistics Canada, 2001 Farm Environmental Management Survey.